KERR 216 Flood-Mapping Model Evaluation Workshop

GIS Component: Flood Analyst Extension

Advanced Technology Solutions, Inc.

Topics

- Definitions
- Application Design Objective
- Application Capabilities
- Application Architecture
- Analysis Components
- Base Map Data
- System Dependencies

Definitions

- Reporting period – It is the beginning and ending dates for an OASIS hydrologic model simulation. It is stored within the model_dates.txt file created by RRBROM.
- Flood event – “x” consecutive days of a "flood condition" followed by “y” consecutive days of "non flood" condition. The user defines these threshold values within in the GIS extension.
- Growing season – Typically March 1 - June 30, but can be defined by user within the GIS extension.
- Depth of flood – Values represent depth of water above the surface elevation.

Design Objectives

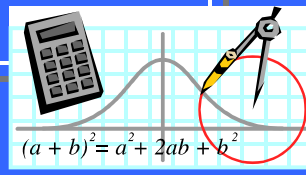
- Visualize the extent and depth of flood from regulated dam releases
- Quantify plant community type acreage by flood depth
- Map geographic coincidence of community type and depth of flood or flood events
- Visualize the frequency and duration of flood events
- Create map plots using predefined map layout templates

Application Capabilities

- File and System management functions
  - Load and symbolize data
    - Themes (15 available) – examples: Soils, Parcels, Conservation Lands, Natural Heritage Sites
    - Depth of flood and flood event scenarios
  - Delete data
    - Depth of flood and flood event scenarios
  - Convert ASCII grids to binary
  - Create the initial map view
    - Load base map features and land cover grid
- Mapping functions
  - B Size 11” x 17” landscape template
  - E Size 34” x 44” landscape template
- Help function

Application Capabilities

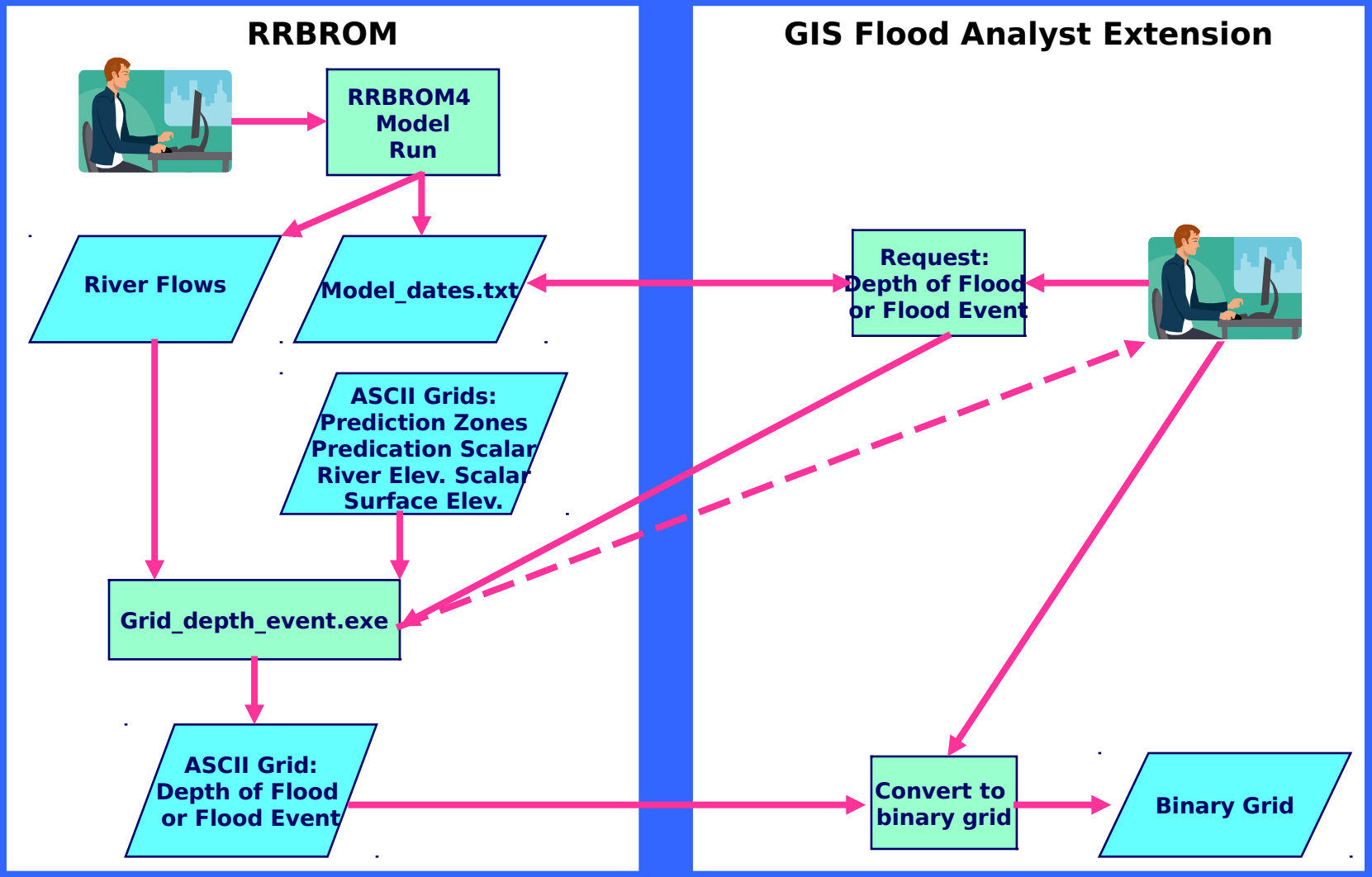
- **RRBROM integration functions**
  - **Create depth of flood grids**
  - **Create flood event grids**
    - **Types of event grids**
      - **Average (mean) number of days in events**
      - **Total no. of event days across all events**
      - **Maximum no. of days for longest event**
      - **Total no. of events**
    - **Events can be summarized by growing season and/or year**



Application Capabilities

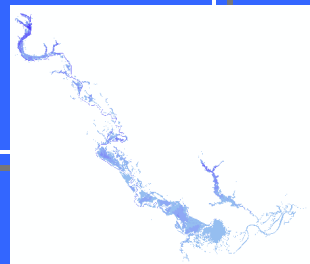
- **Analysis Functions**
  - **User specifies:**
    - **Extent of analysis: all or specific river reaches**
    - **Community types: all or specific community types**
  - **Depth of flood scenario by community type(s)**
    - **Outputs:**
      - **Depth of flood grid: depth values limited to the geographic coincidence of selected river reaches and community types**
      - **Cross tabulation table: flooded acres by community type and flood depth**
  - **Flood event scenario by community type(s)**
    - **Outputs:**
      - **Event grid: values limited to the geographic coincidence of selected river reaches and communi types**

Application Architecture

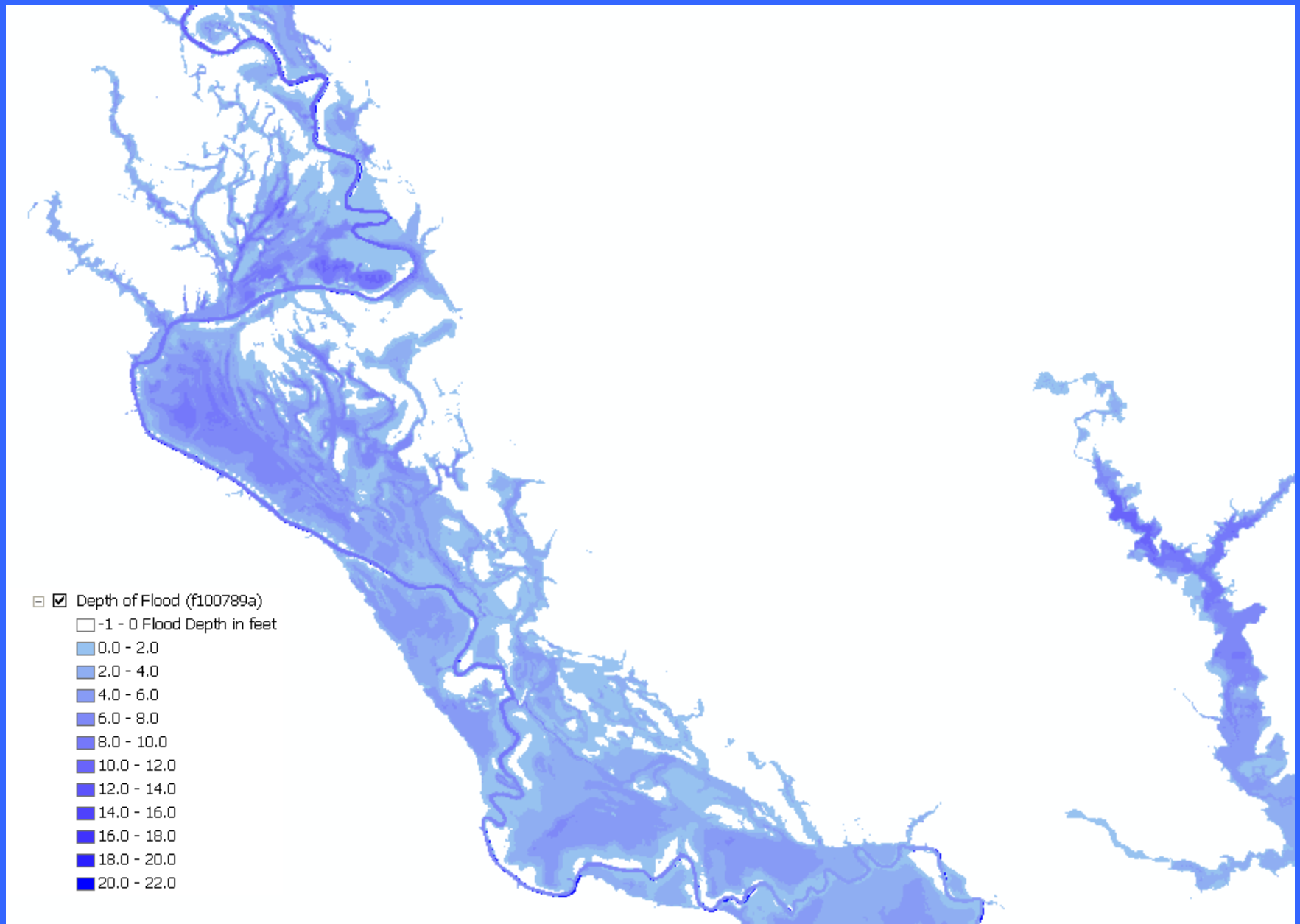

RRBROM
GIS Flood Analyst Extension
RRBROM4 Model Run
River Flows
Model_dates.txt
Request: Depth of Flood or Flood Event
ASCII Grids: Prediction Zones Predication Scalar River Elev. Scalar Surface Elev.
Grid_depth_event.exe
ASCII Grid: Depth of Flood or Flood Event
Convert to binary grid
Binary Grid

Depth of Flood Output

- Depth of flood grid for user defined date
  - Depth of flood in decimal feet
  - Grid name:
    - Grid name prefix of “f” plus date of flood scenario
    - User adds a model run identifier
    - Example: f081040a and f081040b for two different model scenarios on the same date
  - Classified by 2’ depth increments
  - File format: ESRI Grid
  - Projection: UTM Zone 18, NAD 1983, meters
  - Cell size: 25 x 25 meters

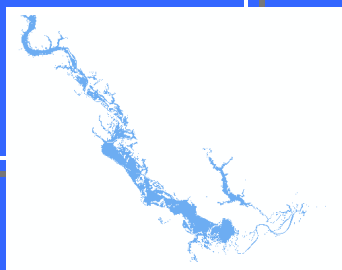


Depth of Flood Output

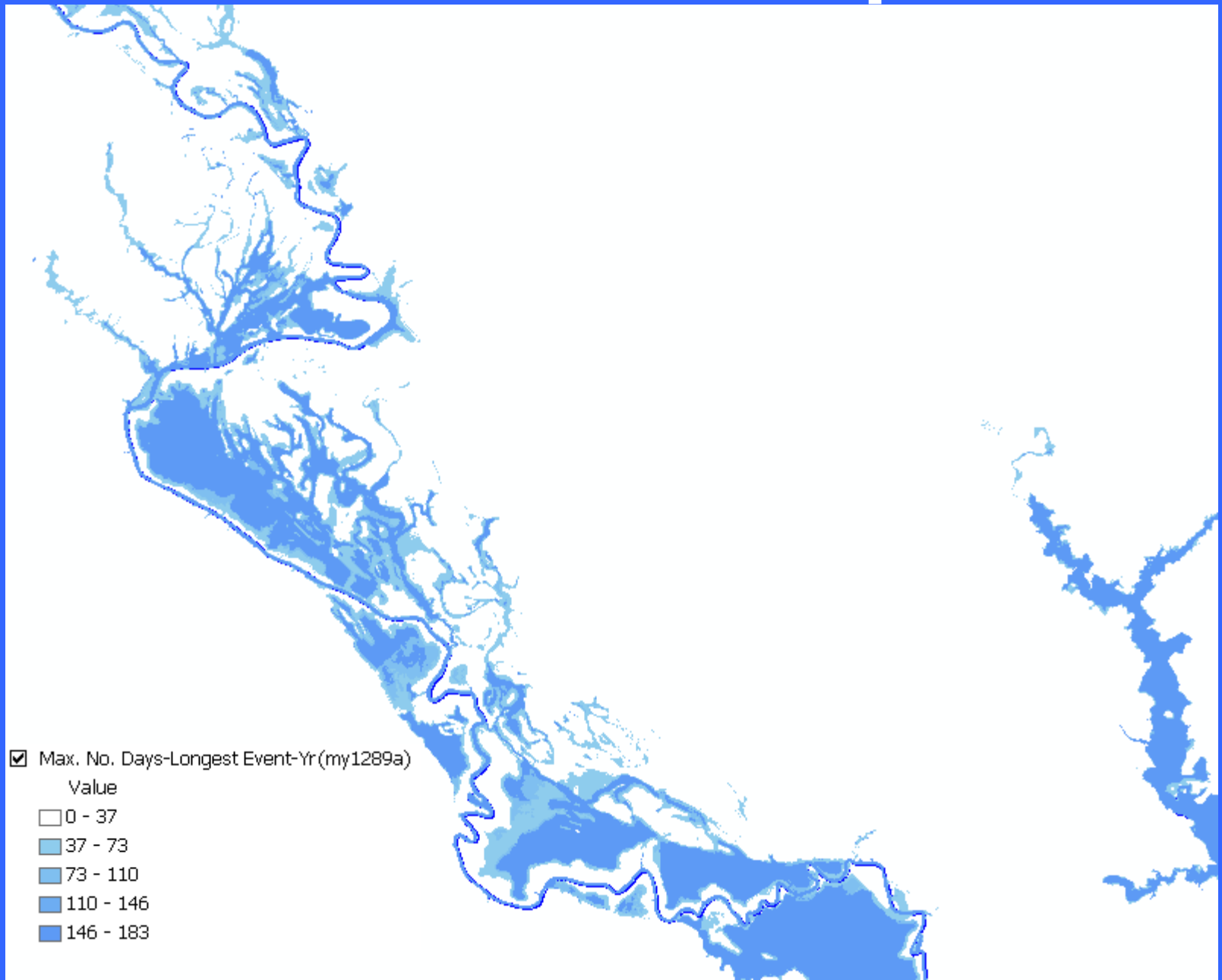


Flood Event Outputs

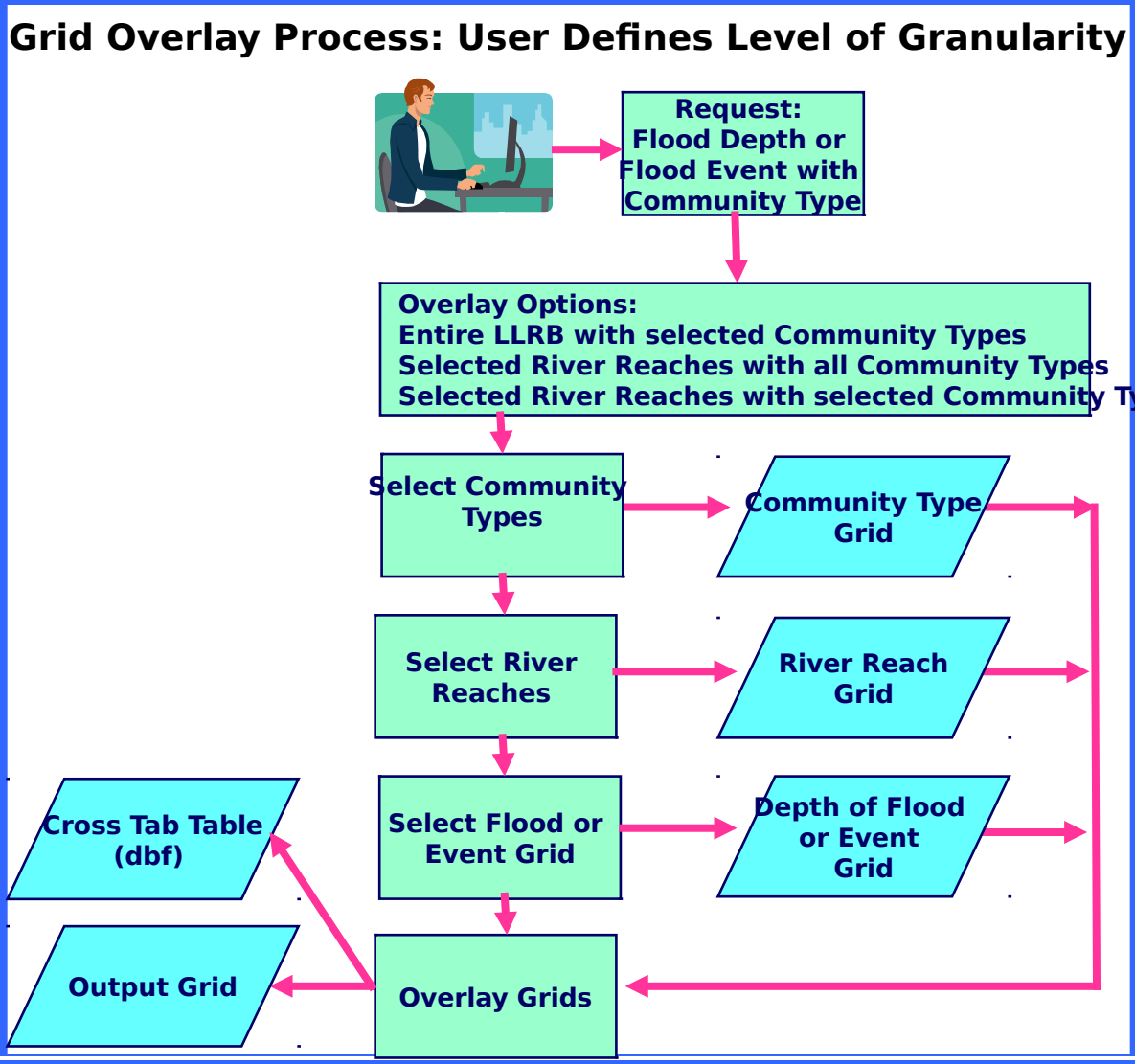
- Event grid for user defined date range for Growing Season and/or Year:
  - Average (mean) number of days in events (days)
    - Grid name prefix: AG or AY
  - Total no. of event days across all events (days)
    - Grid name prefix: DG or DY
  - Maximum no. of days for longest event (days)
    - Grid name prefix: MG or MY
  - Total no. of events (count)
    - Grid name prefix: TG or TY
- Grid name:
  - Grid name prefix plus the month and year of ending date
  - User adds a model run identifier
- Classified by count ranges or day ranges
- File format: ESRI Grid
- Projection: UTM Zone 18, NAD 1983, meters
- Cell size: 25 x 25 meters



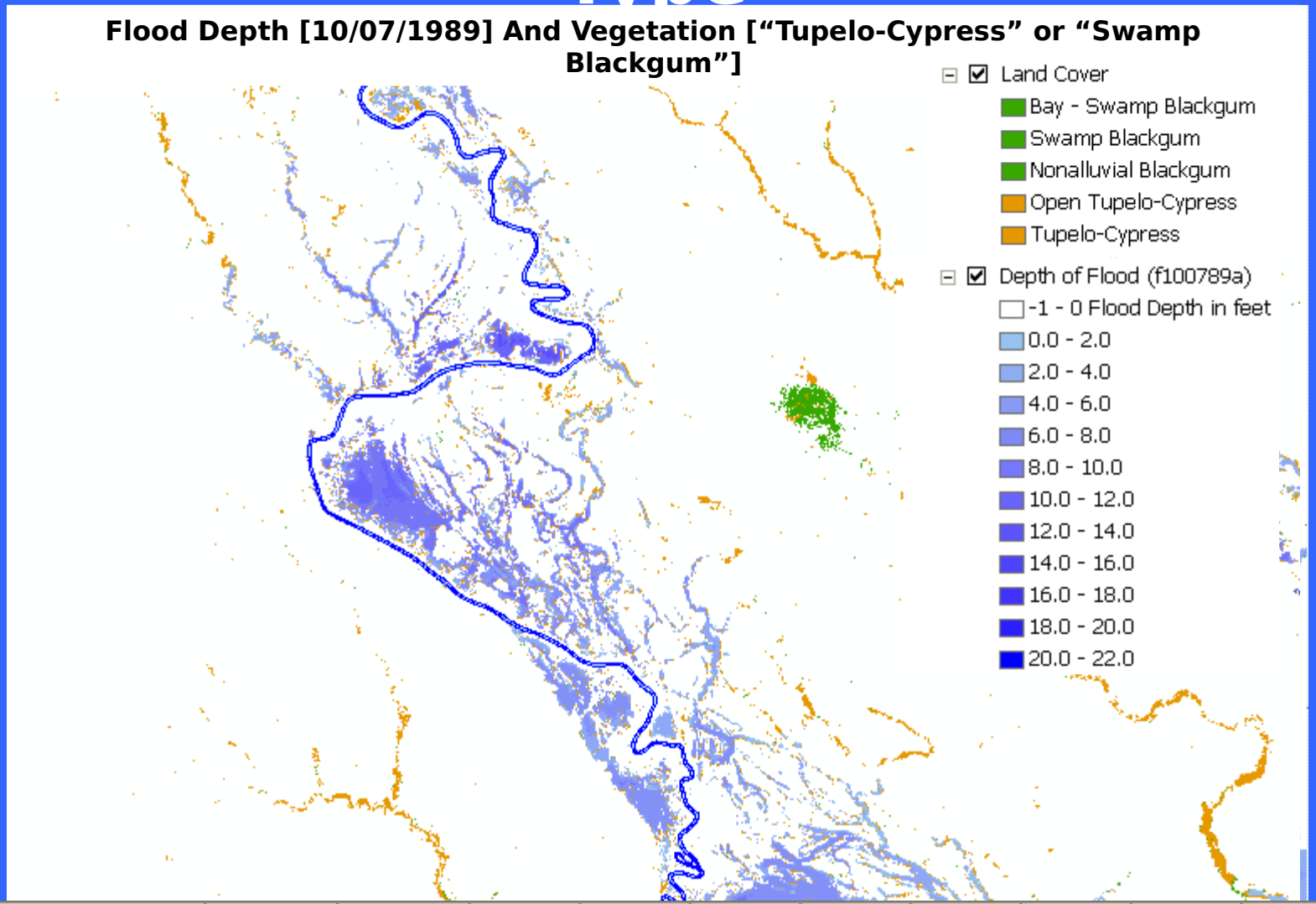
Flood Event Output



Analysis Components

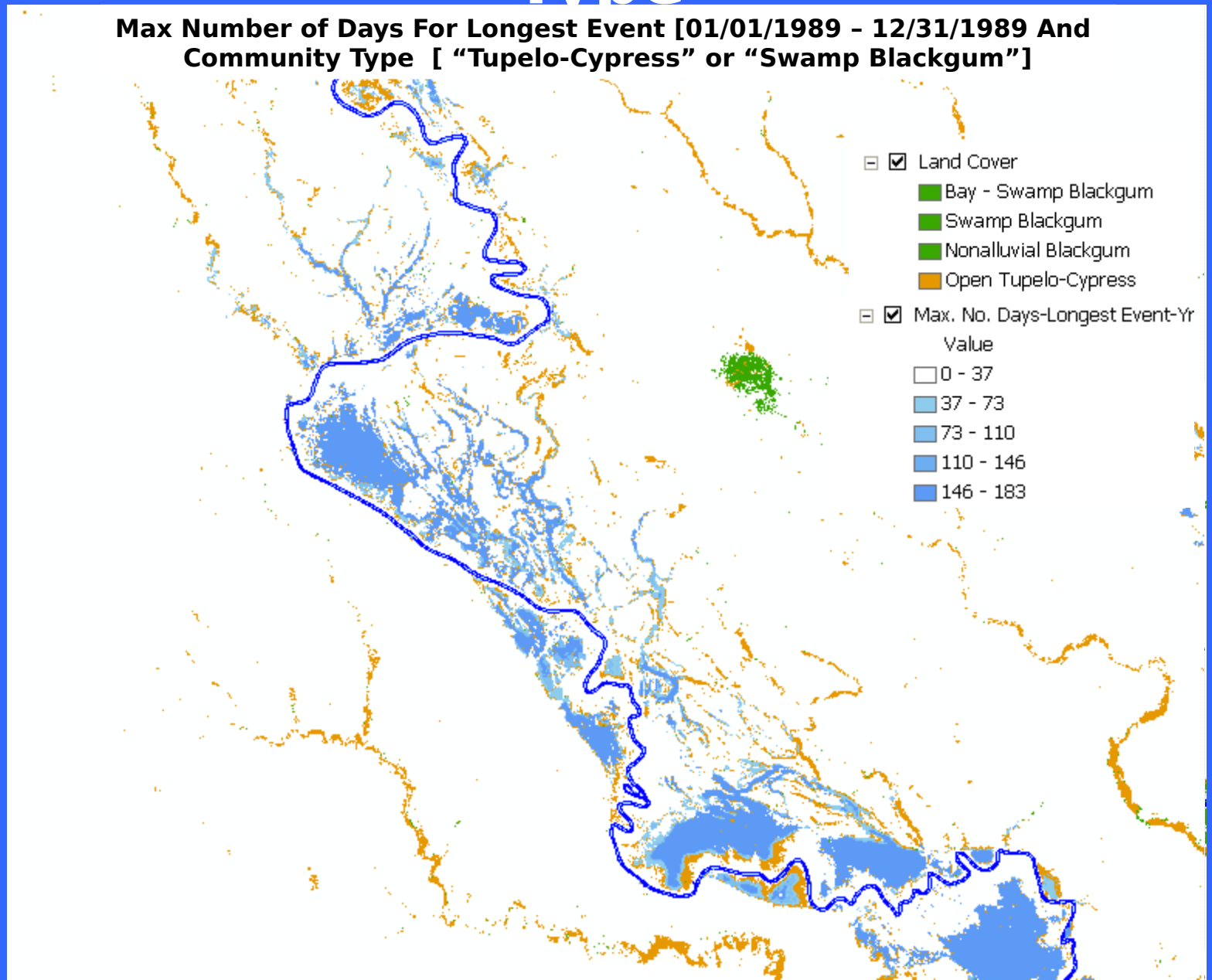


Evaluate Flood by Community Type



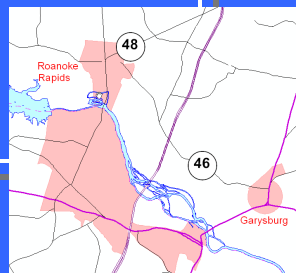
Class	TotalAcres	NonFlood	DF0-2	DF2-4	DF4-6	DF6-8	DF8-10	DF10-12	DF12-14	DF14-16	DF16-18
Bay-Swamp Blackgum	1724.7	584.02	1037.05	90.52	8.45	4.23	0.44	0	0	0	0
Swamp Blackgum	14803.99	4741.32	8389.56	1293.92	218.62	131.88	28.69	0	0	0	0
Nonalluvial Blackgum	1312.82	892.49	144.11	148.12	78.95	22.91	18.46	7.34	0.44	0	0
Open Tupelo-Cypress	3164.74	536.2	442.35	1092.87	761.49	205.5	82.51	34.25	8.23	1.33	0
Tupelo-Cypress	53208.07	12353.6	17542.83	10015.29	8869.72	2609.19	1411.34	350.95	37.36	6.89	10.9

Evaluate Event by Community Type



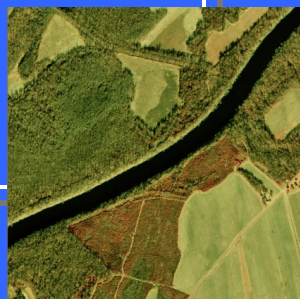
Base Map Data

- **Vector Data**
  - **Provide base map and referential context**
  - **Examples include roads, tax parcels, political boundaries, soils, river reaches**
  - **Some data are added when the application loads, and others added by the user “as needed”**
  - **Stored as “feature classes” within ESRI Personal Geodatabase (an MS Access database)**
  - **Data model complies with Spatial Data Standard for Facilities, Infrastructure, and Environment (SDSFIE)**
  - **Map sources and accuracies vary:**
    - **USGS 1:250,000 DLG files – map key or locator**
    - **USGS 1:24,000 DLG files – mapping within river basin**
    - **GPS swamp gauges**



Base Map Data

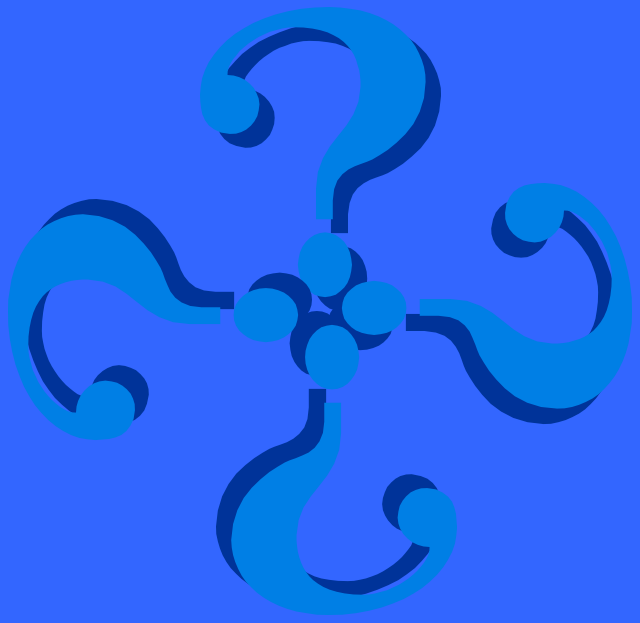
- Digital Ortho Quarter Quads (DOQQ)
  - Full coverage of the study area
  - Near infrared images
  - Date range: 2000+
  - File format: Mr SID images
  - Projection: North Carolina State Plane, NAD 1983, meters
  - Cell size: 1 x 1 meter
  - Source: USGS DOQQ program



System Dependencies

- System testing completed under:
  - Microsoft Windows XP Professional, SP 2
  - ArcView 9.0.3 (ESRI)
  - Spatial Analyst Extension (ESRI)
- Might work under other Windows or ESRI environments, but not tested
- Creating depth of flood and flood event grids requires model simulation and modeldates.txt created previously by RRBROM4

Questions Or Discussion?



Text Parameters For Grid Request

Flood Grid:

C:\TNC_GIS\ArcGIS_Flood_Extension\grid_depth_event.exe RUNDIR=C:\TNC_GIS\ArcGIS_Flood_Extension\Rrbrom\runs\simulation\simbase INIDIR=C:\TNC_GIS\ArcGIS_Flood_Extension RUNTYPE=1 ENDDATE=070232

Event Grid:

C:\TNC_GIS\ArcGIS_Flood_Extension\grid_depth_event.exe RUNDIR=C:\TNC_GIS\ArcGIS_Flood_Extension\Rrbrom\runs\simulation\simbase INIDIR=C:\TNC_GIS\ArcGIS_Flood_Extension RUNTYPE=2 YEARTYPE=2 BEGDATE=010183 ENDDATE=123183 BEGGROW=0301 ENDGROW=0630 ON=05 OFF=05

Where:

Run type is 1. 1=depth, 2=event analysis
Year type is 2. 1=year, 2=growing season, 3=both
Beginning date is 010183
Ending date is 123183
Beginning date of growing season in 0301
Ending date of growing season in 0630
Consecutive days to turn event on is 05
Consecutive days to turn event off is 05
RUNDIR is the location for output.dss
INIDIR is the location for regression_eqs.dat